

Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) **EP 0 951 086 A3**

(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
17.10.2001 Bulletin 2001/42

(51) Int Cl.7: **H01M 8/02, H01M 8/24**

(43) Date of publication A2:
20.10.1999 Bulletin 1999/42

(21) Application number: **99106282.9**

(22) Date of filing: **16.04.1999**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **17.04.1998 JP 10761198**
17.04.1998 JP 10761298
20.08.1998 JP 23476298

(71) Applicant: **Matsushita Electric Industrial Co., Ltd.**
Kadoma-shi, Osaka-fu, 571-8501 (JP)

(72) Inventors:
• **Gyoten, Hisaaki**
Shijonawate-shi, Osaka 575-0013 (JP)
• **Hatoh, Kazuhito**
Daitou-shi, Osaka, 574-0076 (JP)
• **Nishida, Kazufumi,**
Moriguchi-shi, Osaka 570-0016 (JP)

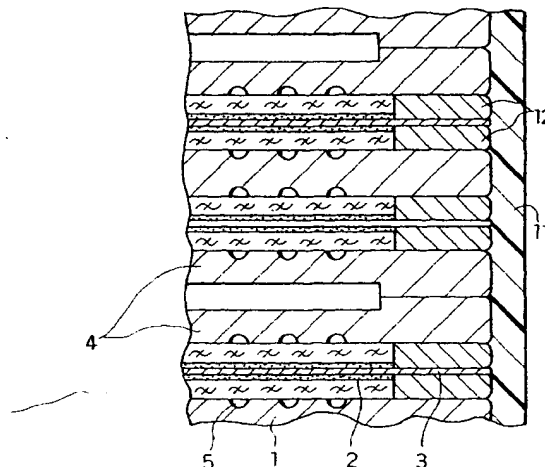
- **Ohara, Hideo**
Kadoma-shi, Osaka 571-0014 (JP)
- **Yasumoto, Eiichi**
Katano-shi, Osaka 576-0021 (JP)
- **Kanbara, Teruhisa**
Ikeda-shi, Osaka 563-0021 (JP)
- **Uchida, Makoto**
Hirakata-shi, Osaka 573-1145 (JP)
- **Sugawara, Yasushi**
Neyagawa-shi Osaka 572-0055 (JP)
- **Matsumoto, Toshihiro**
Ibaraki-shi, Osaka 567-0821 (JP)
- **Nakagawa, Kouji**
Ninamikawachi-gun, Osaka 583-0992 (JP)

(74) Representative: **Dr. Elisabeth Jung**
Dr. Jürgen Schirdewahn Dipl.-Ing. Claus
Gernhardt
Clemensstrasse 30
80803 München (DE)

(54) **Solid polymer electrolyte fuel cell and method for producing the same**

(57) A compact solid polymer electrolyte fuel cell having a simplified structure of a high mechanical strength and an improved gas-sealing property is disclosed. In the solid polymer electrolyte fuel cell of the present invention, gas-tight electrically insulating layers (11,12) are provided on the flanks or the insides of the module of the above-mentioned laminated unit cells, thereby to give a gas-tightness between said electrode and separator (4).

FIG. 8



EP 0 951 086 A3



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 10 6282

| DOCUMENTS CONSIDERED TO BE RELEVANT | | | |
|--|---|--|---|
| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.6) |
| X | PATENT ABSTRACTS OF JAPAN vol. 1996, no. 10, 31 October 1996 (1996-10-31) -& JP 08 162143 A (TOYOTA MOTOR CORP), 21 June 1996 (1996-06-21) * abstract * | 1-3, 5, 8 | H01M8/02 H01M8/24 |
| Y | --- | 6, 11, 12 | |
| Y | PATENT ABSTRACTS OF JAPAN vol. 012, no. 337 (E-657), 12 September 1988 (1988-09-12) -& JP 63 098970 A (FUJI ELECTRIC CO LTD), 30 April 1988 (1988-04-30) * abstract * | 6 | |
| Y | --- | 6 | |
| Y | PATENT ABSTRACTS OF JAPAN vol. 013, no. 564 (E-860), 14 December 1989 (1989-12-14) -& JP 01 235165 A (FUJI ELECTRIC CO LTD), 20 September 1989 (1989-09-20) * abstract * | 6 | |
| Y | --- | 11 | TECHNICAL FIELDS SEARCHED (Int.Cl.6) H01M |
| Y | PATENT ABSTRACTS OF JAPAN vol. 1996, no. 12, 26 December 1996 (1996-12-26) -& JP 08 222237 A (AISIN AW CO LTD; AQUEOUS RES:KK), 30 August 1996 (1996-08-30) * abstract * | 11 | |
| Y | --- | 12 | |
| | US 5 300 370 A (WASHINGTON KIRK B ET AL) 5 April 1994 (1994-04-05) * column 10, line 41 - line 54: claim 1; figure 10 * * column 13, line 55 - line 68 * --- -/-- | 12 | |
| The present search report has been drawn up for all claims | | | |
| Place of search THE HAGUE | | Date of completion of the search 24 August 2001 | Examiner D'hondt, J |
| CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document 1 : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date O : document cited in the application I : document cited for other reasons 8 : member of the same patent family, corresponding document | | | |



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 10 6282

| DOCUMENTS CONSIDERED TO BE RELEVANT | | | | |
|--|---|----------------------------------|--|---|
| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.6) | |
| P,X | GB 2 323 700 A (BALLARD POWER SYSTEMS) 30 September 1998 (1998-09-30) * page 17, line 6 - line 12; figure 5B * * page 13, last paragraph * * page 2, line 3 - line 6 * * page 15, line 5 - line 9; figure 3D * * page 10, line 6 - line 12 * * claims 1,8,9,18-20 * * page 10, line 13 - page 11, line 2 * --- | 1,2,4,5, 8-10, 12-14 | | |
| P,X | WO 98 33225 A (MAGNET MOTOR GMBH ;KOSCHANY ARTHUR (DE); SCHWESINGER THOMAS (DE)) 30 July 1998 (1998-07-30) * page 15, line 4 - page 18, line 2; claims 1,2,11-18,27,32,33 * * page 18, line 22 - page 9, line 2 * --- | 1,2,5,8 | | |
| P,X | GB 2 326 017 A (MOTOROLA INC) 9 December 1998 (1998-12-09) * page 2, line 21 - page 3, line 2; figure 2 * --- | 1,2,4,5, 14 | | TECHNICAL FIELDS SEARCHED (Int.Cl.6) |
| X | PATENT ABSTRACTS OF JAPAN vol. 013, no. 240 (E-767), 6 June 1989 (1989-06-06) -& JP 01 043974 A (HITACHI LTD), 16 February 1989 (1989-02-16) * abstract * | 1-5,14 | | |
| A | PATENT ABSTRACTS OF JAPAN vol. 013, no. 468 (E-834), 23 October 1989 (1989-10-23) -& JP 01 183071 A (MEIDENSHA CORP), 20 July 1989 (1989-07-20) * abstract * --- -/-- | 1 | | |
| The present search report has been drawn up for all claims | | | | |
| Place of search: | | Date of completion of the search | Examiner | |
| THE HAGUE | | 24 August 2001 | D'hondt, J | |
| <p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>I : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application F : document cited for other reasons * : member of the same patent family corresponding document</p> | | | | |



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 10 6282

| DOCUMENTS CONSIDERED TO BE RELEVANT | | | |
|--|---|----------------------------------|--|
| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.6) |
| A | PATENT ABSTRACTS OF JAPAN vol. 1996, no. 07, 31 July 1996 (1996-07-31) -& JP 08 078028 A (AQUEOUS RES:KK), 22 March 1996 (1996-03-22) * abstract * | 1 | |
| A | PATENT ABSTRACTS OF JAPAN vol. 007, no. 036 (E-158), 15 February 1983 (1983-02-15) -& JP 57 187874 A (HITACHI SEISAKUSHO KK), 18 November 1982 (1982-11-18) * abstract * | 1 | |
| The present search report has been drawn up for all claims | | | TECHNICAL FIELDS SEARCHED (Int.Cl.6) |
| Place of search | | Date of completion of the search | Examiner |
| THE HAGUE | | 24 August 2001 | D'hondt, J |
| <p>CATEGORY OF CITED DOCUMENTS</p> <p>X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background Q: non-written disclosure I: intermediate document</p> <p>T: theory or principle underlying the invention E: earlier patent document, but published on or after the filing date D: document cited in the application L: document cited for other reasons &: member of the same patent family, corresponding document</p> | | | |

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 99 10 6282

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

24-08-2001

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---------------------|--|--|
| JP 08162143 A | 21-06-1996 | NONE | |
| JP 63098970 A | 30-04-1988 | NONE | |
| JP 01235165 A | 20-09-1989 | NONE | |
| JP 08222237 A | 30-08-1996 | NONE | |
| US 5300370 A | 05-04-1994 | AU 5415994 A WO 9411912 A | 08-06-1994 26-05-1994 |
| GB 2323700 A | 30-09-1998 | DE 19713250 A US 6080503 A CA 2233440 A GB 2348047 A, B | 15-10-1998 27-06-2000 29-09-1998 20-09-2000 |
| WO 9833225 A | 30-07-1998 | DE 19703214 C AU 6617298 A CN 1251212 T EP 0966770 A | 05-11-1998 18-08-1998 19-04-2000 29-12-1999 |
| GB 2326017 A | 09-12-1998 | DE 19823880 A FR 2764122 A SE 9801942 A | 10-12-1998 04-12-1998 04-12-1998 |
| JP 01043974 A | 16-02-1989 | NONE | |
| JP 01183071 A | 20-07-1989 | JP 2748379 B | 06-05-1998 |
| JP 08078028 A | 22-03-1996 | NONE | |
| JP 57187874 A | 18-11-1982 | JP 1439833 C JP 62046952 B | 19-05-1988 05-10-1987 |

EPCPCMV P. 459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82